DOCUMENT RESUME

ED 158 043 CE 017 493

AUTHOR Whitmore, Paul G.; Fry, John P.
TITLE Soft Skills: Definition, Behavioral Model Analysis, Training Procedures. Professional Paper 3-74.
INSTITUTION Human Resources Research Organization, Alexandria, Va.
SPONS AGENCY Army Research Inst. for the Behavioral and Social Sciences, Arlington, Va.
REPORT NO HumRRO-PP-3-74
PUB DATE Mar 74
NOTE 48p.; Papers presented at the United States Continental Army Command (CONARC) Soft Skills Training Conference (Fort Bliss, Texas, December 12-13, 1972)

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Behavioral Objectives; Behavior Change; Counselor Training; Definitions; Demonstration Programs; Job Skills; Leadership Training; *Management Education; Military Training; Officer Personnel; Performance Based Education; *Problem Solving; *Skill Analysis; Supervisory Training; Systems Building; Training Objectives; *Training Techniques
IDENTIFIERS *Soft Skills; United States

ABSTRACT

In a report on leadership research for the U.S. Army, three papers dealing with soft skills analysis and training are presented. "What Are Soft Skills?" describes a questionnaire designed to clarify the terms "hard" and "soft" skills. Soft skills are defined as important job-related skills that involve little or no interaction with machines and whose application on the job is quite generalized. "The Behavioral Model as a Tool for Analyzing 'Soft Skills'" discusses leadership and motivation job functions in terms of principles of behavior modification and describes development of a behavioral model of the different levels of an organization. "Procedures for Implementing Soft-Skill Training in CONARC Schools" describes the instructional approach based on a tested problem-solving framework. Small groups and student-centered learning were cited as important factors in the instructional approach. (Army Work Unit MODMAN, Model for Systems Engineering of Man-Ascendant Jobs, is concerned with developing procedures for systems engineering of non-machine or soft skills, such as command, supervision, counseling, and leadership.) (Authors/CSS)

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Professional Paper 3-74

HumRRO-PP-3-74

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SOFT SKILLS: Definition
Behavioral Model Analysis
Training Procedures

Paul G. Whitmore and John P. Fry

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Three papers presented at the
CONARC Soft Skills Conference
Fort Bliss, Texas December 1972

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300 North Washington Street • Alexandria, Virginia 22314

Approved for public release; distribution unlimited.

CE 017 493

March 1974

Prepared for

U.S. Army Research Institute for the
Behavioral and Social Sciences
1300 Wilson Boulevard
Arlington, Virginia 22209

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Published
March 1974
by
HUMAN RESOURCES RESEARCH ORGANIZATION
300 North Washington Street
Alexandria, Virginia 22314

Prefatory Note

These three papers dealing with skills analysis and training procedures were presented at the CONARC Soft Skills Training Conference, sponsored by the U.S. Continental Army Command at the Air Defense School, Fort Bliss, Texas, 12-13 December 1972. The purpose of the conference was to foster an extensive interchange among CONARC representatives and invited participants regarding approaches to the systems engineering of soft skill training.

"What are Soft Skills?" and "The Behavioral Model as a Tool for Analyzing Soft Skills" were presented at the opening general session of the conference. "Procedures for Implementing Soft-Skill Training in CONARC Schools" was presented at the Soft-Skill Training Developments workshop session.

Dr. Whitmore is a senior staff scientist and Dr. Fry a senior scientist at the HumRRO Western Division at Fort Bliss, Texas (formerly HumRRO Division No. 5). "What are Soft Skills?" is based upon work performed under the Department of the Army Work Unit MODMAN, Model for Systems Engineering of Man-Ascendant Jobs. The other two papers are based on MODMAN and related HumRRO research for the Department of the Army.

* * *

Since these papers were presented in December 1972, several changes have taken place in Army organizations and command relationships mentioned in these presentations.

Headquarters, U.S. Continental Army Command (CONARC) has been reorganized and designated Headquarters, Training and Doctrine Command (TRADOC).

The U.S. Army Chemical School was disestablished on 24 June 1973. In the third paper in this publication ("Procedures for Implementing Soft-Skill Training in CONARC Schools"), there is a detailed description of implementation of the problem-solving approach in the Chemical Officer Course (5-3-C22), with recommendations for improvement. Although this course has been eliminated, the experience derived and the suggestions made for course improvement would be relevant for similar courses in other schools.

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WHAT ARE SOFT SKILLS?

John P. Fry and Paul G. Whitmore

Work Unit MODMAN is concerned with developing procedures for systems engineering of soft-skills, such as command, supervision, counseling, and leadership. At the outset we wanted to find out what the term *"soft" skills* meant to staff members of U.S. Continental Army Command (CONARC) schools, since they are our clients. There seemed to be several dimensions on which one could define a "soft" to "hard" continuum of skills. We developed a questionnaire employing nine dimensions, and asked knowledgeable representatives of the various CONARC schools to judge 35 general job functions on these nine dimensions. The 35 job functions cut across a majority of officer jobs.

We sent two questionnaires to each of 29 CONARC schools. There were 35 respondents from 21 of the schools, for a 72% overall return rate. One of the schools that did not participate, the Army War College, did not see the relevance of the questionnaire content to their curriculum.

Reliability of Measurement

Our first analysis was to determine by inspection the usefulness of the nine dimensions as measurement devices. As a result, one dimension, Assessibility of Criteria, was eliminated because most respondents failed to agree on where the various job functions belonged in that dimension. In other words, its distributions of scores were generally either flat or bi-modal. Thus, eight dimensions survived this test of consistency.

Three of these dimensions were intended to help clarify and distinguish between what is meant by "soft" and "hard" skills. Four dimensions were intended to test the hypothesis that many training specialists were having difficulty in trying to systems-engineer the listed job functions or similar ones because of inadequate document descriptions. Thus, the results of the questionnaire will be discussed in two sections.

What Are Soft Skills?

The CONARC regulation on systems engineering of training (CON Reg 350-100-1) defines "soft" skills as:

> ". . . . job related skills involving actions affecting primarily people and paper, e.g., inspecting troops, supervising office personnel, conducting studies, preparing maintenance reports, preparing efficiency reports, designing bridge structures (p. 28)."

This definition leaves considerable room for interpretation.

The three dimensions used in the questionnaire in an attempt to define soft skills were:

(1) Degree of interaction with a machine.
(2) Degree of specificity of the behavior, action, or process to be performed.
(3) Typical kind of on-the-job situation.

Table 1 shows the median[1] response by the 35 respondents to each of the 35 common officer job functions on each of the three dimensions. In addition, the judged importance of each job function is included in the table.

The dimensions and the categories on each dimension are defined as follows:

A. Importance. Indicates how important the judges felt each job function is, relevant to jobs held by graduates of the Officer Advanced Course (C-22). Categories on this scale were: Great, High, Moderate, Low, and Little.

B. Degree of Interaction With a Machine Required by the Job Function. At one extreme, an individual constantly operates a machine (such as a radarscope) *or* fills out a piece of paper (such as a maintenance form). At the other extreme, a job incumbent may manipulate machines (or forms) as entities but does not actually operate them or fill them out *per se*. For example, a commander may use the mental image of radarscopes or maintenance forms in solving a problem, but he need not interact with them directly. (In a sense, the term "*man-ascendant*" refers to the latter extreme, where man is in control or dominates. In contrast, "*machine-ascendant*" refers to jobs where machines dominate.) Categories here were: Always, Some, Moderate, Little, and Never (or indirectly).

C. Degree of Specificity of the Behavior to be Performed. This dimension also includes *actions* or *processes* to be performed. At one extreme, they can be explicitly stated and their application on the job is also quite specific. For example, there probably is only one way to change the oil of a given vehicle. At the other extreme, behavior, actions, or processes are either implied within some context or application on the job is quite generalized. An example might be the requirement that the commander be able to *motivate* or *lead* troops, whenever and wherever the situation calls for it. Categories on this scale were: Very Specific, Specific, Moderate, General, and Very General.

D. Typical Kind of On-the-Job Situation. This dimension defines a continuum of on-the-job situations from *established* to *emergent*. In *established* situations, (a) physical and social environmental conditions are known, and (b) the consequences of alternative courses of action are known. On the other hand, in *emergent* situations, (a) *not* all physical and social environmental conditions have been determined, and (b) the consequences of alternative courses of action are *not* always known. Usually, job functions in emergent situations are also associated with a large amount of uncertainty.

Judges rated each job function relevant to on-the-job situations as they were deemed to exist for job encumbents. Categories were: Very Established, Established, Medial, Emergent, and Very Emergent.

Most of the job functions were judged to be of *Great* importance; none were thought to be of low or little importance to the C-22 graduate.

Likewise, most of the job functions were judged to *Never* "interact with a machine"; only two job functions (29, 30) were thought to even interact to a moderate degree.

Results on the "degree of specificity" dimension were also predominantly one-sided (i.e., *General* or *Very General*). Only three job functions (3, 31, 35) were judged *Specific* or *Very Specific*.

Finally, and consistent with the above dimensions, only three job functions (3, 30, 31) were judged to be *Established*.

In general, distributions of scores on the three dimensions were very similar across all 35 job functions.

[1] The *median* measure of central tendency is preferred here because the scales used were ordinal; equal intervals cannot be assumed. As it turned out, for almost all scales the mean was more moderate and the mode was more extreme than the *median*, indicating rather skewed distributions of scores.

Table 1

Ratings of 35 Common Officer Job Functions on Three "Hard-Soft" Skill Dimensions

List of Job Functions	Dimension[a]			
	Importance	Degree of Interaction With A Machine	Degree of Specificity of Behaviors to Be Performed	Typical Kind of On-the-Job Situation
1. Formulates and evaluates hypotheses regarding probable enemy actions.	Great	Never	General	Emergent
2. Evaluates the capability and limitations of his unit to perform its primary assigned mission (combat or non-combat).	Great	Little	General	Medial*
3. Interprets and uses a military map.	High	Little	Very Specific	Established
4. Formulates and evaluates alternative tactical or operational plans.	Great	Never	General	Emergent
5. Briefs subordinates/visitors/seniors on action to be taken or on status of unit.	Great	Little	Moderate*	Medial*
6. Debriefs subordinates after action has been taken.	High	Never	General	Medial*
7. Identifies operational problems or deficiencies.	Great	Little	General	Emergent
8. Develops training programs to correct operational problems or deficiencies.	Great	Little	General	Emergent
9. Identifies information and resources required to carry out training programs.	High	Little	Moderate	Medial*
10. Inspects and determines worth, quality, or state of a mission operation, installation unit, or item.	Great	Little	General	Medial
11. Evaluates subordinates' job performance and career potential.	Great	Never	General	Emergent*
12. Provides guidance and establishes performance standards for subordinates.	Great	Never	General	Emergent
13. Conducts performance and career counseling of subordinates.	Great	Never	General	Emergent
14. Conducts personal counseling of subordinates.	High	Never	Very General	Emergent
15. Establishes job roles and selects personnel for tasks.	Great	Little	General	Medial
16. Develops immediate surordinates into a cooperative and productive team.	Great	Never	Very General	Emergent
17. Establishes management practices which develop all subordinate personnel into a cooperative and productive unit.	Great	Never	General	Emergent
18. Assigns responsibility and delegates authority to lowest practical level.	Great	Never	General	Emergent*

Continued

Table 1 *(Continued)*

Ratings of 35 Common Officer Job Functions on Three "Hard-Soft" Skill Dimensions

List of Job Functions	Dimension[a]			
	Importance	Degree of Interaction With A Machine	Degree of Specificity of Behaviors to Be Performed	Typical Kind of On-The-Job Situation
19. Handles complaints and resolves conflict between argumentative (perhaps angry or hostile) subordinates.	High	Never	Very General	Very Emergent
20. Motivates subordinates and maintains self-discipline through use of positive and negative incentives.	Great	Never	General	Emergent
21. Develops capacity of subordinate leaders to assume increased responsibility and initiative without close supervision.	Great	Never	General	Emergent
22. Changes subordinates' counter-productive attitudes toward more positive ones (e.g., increases positive attitudes toward safety, reduces prejudices).	High	Never	Very General	Very Emergent
23. Determines and evaluates his subordinates' morale.	High	Never	Very General	Emergent
24. Determines and maintains trust and "open" (two-way) communications.	Great	Never	Very General	Very Emergent
25. Sets rules and standards for subordinates' behavior.	Great	Never	Moderate*	Medial
26. Defines and communicates goals and objectives for subordinates and establishes priorities.	Great	Never	General	Emergent
27. Allocates resources to achieve objectives and goals.	Great	Little	General	Medial
28. Facilitates innovation in the existing organization or system.	High	Little	Very General	Very Emergent
29. Determines the adequacy of new procedures, concepts, or equipment at each stage during development (e.g., CDC type job).	High	Moderate	General	Emergent
30. Instructs subordinates face-to-face (e.g., how to read a map).	High	Moderate*	Moderate*	Established
31. Teaches an introductory course or general subject (e.g., combined arms concepts in the C-22 course).	Moderate	Little	Specific	Established

Continued

Table 1 *(Continued)*

Ratings of 35 Common Officer Job Functions on Three "Hard-Soft" Skill Dimensions

List of Job Functions	Dimension[a]			
	Importance	Degree of Interaction With A Machine	Degree of Specificity of Behaviors to Be Performed	Typical Kind of On-The-Job Situation
32. Solves problems where the correct answer is not known (e.g., R & D type job or a problem in leadership).	Great	Little	Very General	Very Emergent
33. Makes tactical and administrative decisions based on current information.	Great	Little	General	Emergent
34. Directs and controls employment of a unit in a training or combat situation.	Great	Little	Moderate*	Emergent
35. Administers military justice to maintain discipline.	High	Never	Specific	Medial*

[a] * indicates bimodal or flat distribution.

However, several job functions revealed inconsistencies among the three dimensions. For example, function 3, "Interprets and Uses a Military Map," was purposely included in the set of job functions as a "hard" skill that made use of paper. Apparently, most of the 35 judges felt that using paper in this way *was not* the same as interacting with a machine. On this basis, it would be categorized as a soft skill.

On the other two dimensions, 79% of the respondents felt that processes for using a map were explicit and constituted a specific application, and 63% felt that the job situations for using maps were known. The responses on these two categories would cause it to be categorized as a hard skill. Thus, it appears that including paper in a definition of soft skills requires an explanation of how that paper is used. Does the user fill in standardized blanks or does he use paper to manipulate ideas or objects as mental images?

Soft skills, then, might be defined as (a) important job-related skills, (b) which involve little or no interaction with machines (including standardized forms) and (c) whose application on the job is quite generalized because the situation or context contains a great deal of uncertainty (i.e., we don't know much about the physical and social environments in which the skill occurs and we don't know much about the consequences of different ways of accomplishing the job function). In other words, those job functions about which we know a good deal are hard skills and those about which we know very little are soft skills.

Adequacy of Document Descriptions

The systems engineering process described in the CONARC regulation relies heavily on the use of Army documents. Hence, our next area of concern was with the adequacy of these documents for systems engineering of soft skills. Four dimensions on the questionnaire were concerned with documentation in addition to "Importance," as follows:

A. Importance. Indicates how important the judges felt each job function is, relevant to jobs held by graduates of the Officer Advanced Course (C-22).

B. Document Description of Behaviors to be Performed. Here judges were asked to indicate how well existing Army documents (manuals, pamphlets, reports, etc.) describe behaviors, actions, or processes for performing each of the given job functions. If documents describe them in such a manner that an individual can actually perform the function, given only the information in the documents, then one extreme of the dimension was met. On the other hand, if documents fail to describe necessary behavior, action, or processes at all, then the other extreme of the dimension was met.

   Categories here, as well as the next two dimensions below, were: Very Adequate, Adequate, Moderate, Inadequate, and Very Inadequate.

C. Document Description of Conditions of Performance. Here existing Army documents were judged as how well they describe the critical characteristics of the conditions or situations in which each job function will be or is performed. One extreme was represented by documents which fail to describe any situations or conditions. Where existing documents describe situations or conditions in such a manner that an individual can develop a broad range of realistic (simulated) training situations or conditions for problem practice or testing purposes, then the opposite extreme was represented.

D. Document Description of Standards of Performance. This dimension asked for an estimation as to how well existing Army documents describe standards of performance or criteria for assessing on-the-job effectiveness of the given job function. The extremes are similar to those outlined above.

E. Specification of Job Requirements. Systems engineering of training requires that the analyst develop a trial inventory of *meaningful* and *useful* tasks. Here judgments were made concerning the degree of difficulty in accomplishing this step for each given job function. Categories here were Very Easy, Easy, Moderate, Difficult, and Very Difficult.

A quick scanning of Table 2 readily reveals that, although most of these job functions are judged to be quite important, the existing Army documents do not provide an adequate description of the behaviors, conditions, or standards associated with most of these job functions. If the information about these job functions is not in the Army documents and if it is not known to staff members at the CONARC schools, it is likely that it is also not known to job incumbents in the field. We clearly need some different approaches that will provide us with good information about the behaviors, the job situations, the conditions, and the standards for these kinds of job functions.

Table 2

Adequacy of Document Descriptions and Ease of Specification for 35 Common Officer Job Functions

List of Job Functions	Document Description[a]				
	Importance	Behaviors to Be Performed	Conditions of Performance	Standards of Performance	Specification of Job Requirements[a]
1. Formulates and evaluates hypotheses regarding probable enemy actions.	Moderate	Moderate	Moderate	Inadequate	Difficult
2. Evaluates the capability and limitations of his unit to perform its primary assigned mission (combat or non-combat).	Great	Moderate	Inadequate	Moderate*	Difficult
3. Interprets and uses a military map.	High	Very Adequate	Very Adequate	Adequate	Very Easy
4. Formulates and evaluates alternative tactical or operational plans.	Great	Moderate*	Moderate	Inadequate	Difficult
5. Briefs subordinates/visitors/seniors on action to be taken or on status of unit.	Great	Moderate	Moderate*	Moderate*	Easy
6. Debriefs subordinates after action has been taken.	High	Moderate	Moderate*	Inadequate	Moderate
7. Identifies operational problems or deficiencies.	Great	Inadequate*	Inadequate	Inadequate	Difficult
8. Develops training programs to correct operational problems or deficiencies.	Great	Inadequate	Inadequate	Inadequate	Moderate
9. Identifies information and resources required to carry out training programs.	High	Inadequate	Adequate	Inadequate*	Moderate
10. Inspects and determines worth, quality, or state of a mission operation, installation unit, or item.	Great*	Moderate*	Inadequate	Moderate	Difficult
11. Evaluates subordinates' job performance and career potential.	Great	Inadequate	Inadequate	Inadequate	Difficult
12. Provides guidance and establishes performance standards for subordinates.	Great	Inadequate	Inadequate	Inadequate	Difficult

(Continued)

Table 2 *(Continued)*

Adequacy of Document Descriptions and Ease of Specification for 35 Common Officer Job Functions

List of Job Functions	Document Description[a]				
	Importance	Behaviors to Be Performed	Conditions of Performance	Standards of Performance	Specification of Job Requirements[a]
13. Conducts performance and career counseling of subordinates.	Great	Inadequate*	Inadequate	Inadequate	Difficult
14. Conducts personal counseling of subordinates.	High	Inadequate	Inadequate	Very Inadequate	Difficult
15. Establishes job roles and selects personnel for tasks.	Great	Inadequate*	Inadequate	Inadequate	Moderate
16. Develops immediate subordinates into a cooperative and productive team.	Great	Inadequate	Inadequate	Inadequate*	Difficult
17. Establishes management practices which develop all subordinate personnel into a cooperative and productive unit.	Great	Inadequate	Inadequate	Inadequate	Difficult
18. Assigns responsibility and delegates authority to lowest practical level.	Great	Inadequate	Inadequate	Inadequate	Difficult
19. Handles complaints and resolves conflict between agrumentative (perhaps angry or hostile) subordinates.	High	Very Inadequate	Very Inadequate	Very Inadequate	Difficult
20. Motivates subordinates and maintains self-discipline through use of positive and negative incentives.	Great	Inadequate	Inadequate	Inadequate	Difficult
21. Develops capacity of subordinate leaders to assume increased responsibility and initiative without close supervision.	Great	Inadequate	Inadequate	Inadequate	Difficult
22. Changes subordinates' counter-productive attitudes toward more positive ones (e.g., increases positive attitudes toward safety, reduces prejudices).	High	Very Inadequate	Very Inadequate	Very Inadequate	Difficult*
23. Determines and evaluates his subordinates' morale.					
24. Determines and maintains trust and "open" (two-way) communications.	Great	Inadequate	Inadequate	Inadequate	Difficult

(Continued)

Table 2 *(Continued)*

Adequacy of Document Descriptions and Ease of Specification for 35 Common Officer Job Functions

List of Job Functions	Document Description[a]				
	Importance	Behaviors to Be Performed	Conditions of Performance	Standards of Performance	Specification of Job Requirements[a]
25. Sets rules and standards for subordinates' behavior.	Great	Moderate	Moderate	Moderate	Moderate
26. Defines and communicates goals and objectives for subordinates and establishes priorities.	Great	Inadequate	Inadequate	Inadequate	Moderate
27. Allocates resources to achieve objectives and goals.	Great	Moderate	Moderate*	Moderate*	Moderate
28. Facilitates innovation in the existing organization or system.	High	Very Inadequate	Very Inadequate	Very Inadequate	Very Difficult
29. Determines the adequacy of new procedures, concepts, or equipment at each stage during development (e.g., CDC type job).	High	Moderate*	Moderate*	Inadequate	Difficult
30. Instructs subordinates face-to-face (e.g., how to read a map).	High	Adequate	Adequate	Inadequate	Easy
31. Teaches an introductory course or general subject (e.g., combined arms concepts in the C-22 course).	Moderate	Adequate	Adequate	Adequate	Easy
32. Solves problems where the correct answer is not known (e.g., R & D type job or a problem in leadership).	Great	Inadequate	Inadequate	Very Inadequate	Very Difficult
33. Makes tactical and administrative decisions based on current information.	Great	Moderate	Moderate*	Inadequate	Difficult*
34. Directs and controls employment of a unit in a training or combat situation.	Great	Moderate	Moderate	Moderate*	Difficult
35. Administers military justice to maintain discipline.	High	Adequate	Adequate	Adequate*	Moderate*

[a] *indicates bimodal or flat distribution.

THE BEHAVIORAL MODEL AS A TOOL FOR ANALYZING SOFT SKILLS

Paul G. Whitmore

The Analysis of Purposes and Situations

We cannot evaluate a worker's performance until we know the purposes of his job and the situations in which the job is to be performed. And we cannot train others to do this job until we know what movements or acts will achieve the purposes of the job in the situations in which it is to be performed. The object of systems engineering is to identify the purposes of the job and the situations in which these purposes are to be achieved, the cognitive and perceptual-motor acts for achieving those purposes, and the selection practices and training experiences that will best produce sufficient numbers of people to do the job at the least cost.

Let's begin with the identification of purposes and situations. Sometimes we analyze purposes first and sometimes we analyze situations first. And sometimes we go from one to the other and back again. Much depends upon the specific problem we are dealing with.

Generally, when we are analyzing jobs in a closely integrated, multi-job organization with overall organizational goals, we will analyze purposes first. For instance, if we were analyzing a job or jobs in a combat infantry platoon, we would begin by identifying the general missions which the platoon may be required to perform. Each mission would be analyzed by means of rational processes into successively more detailed subordinate purposes until we reached a level in which a purpose can be performed by a single individual. This is the level of job duties.

However, when we are analyzing jobs that are not integrated into a multi-job organization, we may analyze situations first, rather than purposes. An outstanding example of this type of analysis has been conducted by McKnight and Adams:[1] It is concerned with driving a private automobile. In their words:

> The first step in the process was to identify those aspects of the (highway transportation) system that were capable of creating situations to which the driver must respond—for example, curves in the road, traffic control devices, cars ahead, snow, rain, and driver fatigue. Over 1,000 specific behaviorally relevant system characteristics were identified. These system characteristics were then taken singly and in combination with each other to identify potential critical situations with which a driver may have to cope.

In order to identify the specific purposes and situations which constitute a given job, we begin by analyzing the system in which that job occurs. This initial systems analysis in the systems engineering process is concerned with ensuring the comprehensiveness and validity of the task inventory. With regard to the identification of system characteristics, McKnight and Adams note:

> Inasmuch as this activity formed the foundation for later analyses, particular pains were taken to see that the analysis was very broad, since to overlook any relevant system characteristics could result in the omission of potentially critical . . . behaviors.

[1] *Driver Education Task Analysis: Task Analysis Methods*, by A. James McKnight and Bert B. Adams HumRRO Technical Report 72-13, April 1972.

They began both the situation analysis and the purpose analysis by identifying a restricted number of broadly defined classes of characteristics "which shape the responses the individual must make as a driver;" that is "that might impose behavioral requirements upon the driver." The broad classes of characteristics from which the situation analysis commenced consisted of driver characteristics, vehicle characteristics, roadway characteristics, traffic characteristics, and characteristics of the external environment. These general characteristics guided the identification of specific characteristics gleaned from various sources of information. The initial list of characteristics was arranged into a logical hierarchy or tree-structure, or outline. This hierarchy was examined for logical gaps at each level. The gaps were filled in and in this manner the hierarchy was extended so as to be as comprehensive as possible. Parts of the final hierarchy had as many as seven levels. These situation characteristics were then taken singly and in combination to define the situations with which the subsequent analysis would be concerned.

McKnight and Adams also conducted an analysis of the system's purposes or goals. It was not nearly as elegant as the situation analysis, but it was equally important. As they defined it, the purpose or goal of the highway transportation system is to assure "the movement of passengers and material from one place to another with safety, efficiency, comfort, and responsibility." The characteristics of the goal impose general behavioral requirements on drivers:

> "Safety requires that drivers behave in a way that will minimize the chances of injury or property damage . . ."
>
> "Efficiency requires that drivers avoid interfering with the rapid and economical flow of traffic . . ."
>
> "Comfort requires that drivers operate in ways that will not cause discomfort to passengers, other drivers, or pedestrians . . ."
>
> "Responsibility means that drivers should be morally and financially responsible for the consequences of their acts . . ."

Although the authors do not directly say so, it seems apparent that these general goal characteristics must have been used to identify specific goals or purposes in each situation defined by the situation analysis. These specific goals defined what the effects of the driver's behavior ought to be in the situation. Then the analysis probably proceeded backward from the necessary effects of the behavior to the identification of the behavior itself. This analysis was based on the operational characteristics and principles of automobiles.

The Analysis of a "Soft Skill"

We can specify what a machine operator ought to do if we know the situations or environments in which he works, the purposes of his work in these situations, and the theories of operation of the machines he uses. Now suppose we were dealing with a supervisor or a leader or a counselor. He is not a machine operator; rather, he is a people operator. He directs the activities of people toward the accomplishment of specified purposes in specified situations. However, he must perform under a handicap not imposed on machine operators: namely, his job activities have been only vaguely identified and have not been derived from an unequivocal theory of operation for people. As a result, supervisors tend to seek out or develop their own theory of people operation from which they derive their job activities, or else they accept the common myths about the operation of people which are promulgated by our culture.

The selection of an appropriate theory of people operation is a task for behavioral scientists. But even among such experts, we will find disagreements and myths. It is an

area fraught with the vagaries of ill-defined terms, which must be hacked through with a semantic machete. I personally prefer to deal with leadership and motivation job functions in terms of principles of behavior modification, sometimes also referred to as contingency management, behavior management, reinforcement theory, or operant conditioning. This approach can be recommended for a number of reasons:

(1) The basic principles are relatively simple and easy to learn, and yet have application to a great variety of situations.

(2) Like systems engineering, it is a behavioral approach which deals with specifically defined behaviors.

(3) It leads to the development of precision management processes in which behavior is monitored and progress is audited toward clearly specified goals. This process provides a basis for a continual assessment of effectiveness and for timely and flexible corrective action.

(4) It provides effective and sophisticated alternatives to intimidation, punishment, and permissiveness as general motivational and disciplinary treatments.

I'm not going to subject you to a treatise on behavior modification; there are a number of excellent publications on the topic (see Suggested Readings).

Although behavior modification principles constitute an appropriate theory of people operation for leadership and motivation job functions, other human job functions will involve other theories of people operation. For instance, if we were dealing with target recognition, we would select an appropriate visual perception theory. If we were dealing with complex job decisions, we would select an appropriate decision-making theory.

Now let's look at "worker motivation" as a job function. We begin by analyzing the term "worker motivation" into the kinds of behaviors exhibited by motivated workers. What does the motivated worker do that makes him different from the unmotivated worker? Some suggested operational characteristics of a "motivated worker" are listed in Appendix A. Clearly, a "motivated worker" should perform an adequate amount of work that leads to the attainment of organizational goals. He should exhibit a low frequency of interference with other workers and coordinate his work with others in keeping with organizational goals. When necessary, he should help others to perform their work, if he is able to do so. He should minimize the effects of outside disruptions on his own work and that of others. And we might also want him to choose the organization for its career potential.

These operational characteristics constitute the effects which we wish to bring about in our workers. In this regard, I strongly recommend Bob Mager's recent book, *Goal Analysis*,[1] as a guide for learning how to analyze such fuzzy terms as "motivated worker" into a set of operational characteristics.

Once we have listed the effects or purposes we wish to achieve in operational terms, then we need to select one or more suitable theories of operation from which we can determine what has to be done in order to achieve these effects. A behavior modification approach accounts for behavior in terms of conditions in the environment in which the behavior occurs. The most important environmental conditions consist of the manner in which other people respond to the worker's behavior. In this instance, these other people consist of the employee's supervisor and his fellow workers. Whether or not a worker behaves in a "motivated" fashion depends largely on how other people in his work environment treat him. And how others treat him depends to some extent upon how he treats them.

[1] See Suggested Readings.

Our problem, as systems engineers, is to design a behavior system in which people interact in such a way as to enhance each other's work behavior. We need to determine the critical interpersonal behaviors required from the supervisor, from other workers, and from the worker himself, in order to optimize the worker's job performance. The interpersonal behaviors of both the supervisor and of the other workers should accomplish the same general functions; that is, they need to reinforce the worker for appropriate behavior, refrain from reinforcing him for inappropriate behavior, and minimize aversive stimuli in his environment. The specific ways in which they go about performing these functions will differ.

In Appendix A, the supervisor's functions are stated in behavioral terms and the purposes which make up this function are analyzed, using behavior modification principles as the underlying theory of operation. The supervisor's role is to design and implement management practices, attempting to strengthen the productive behaviors and weaken the counterproductive behaviors of the employees. In order to accomplish this the supervisor must achieve three major purposes or tasks:

(1) He must appropriately reinforce productive behaviors.
(2) He must minimize the inadvertent reinforcement of counterproductive behaviors.
(3) He must minimize aversive conditions in the environment.

Each of these purposes can be analyzed into subordinate purposes. For instance, in order to reinforce productive behavior, the supervisor must:

(1) Identify and define it.
(2) Monitor it.
(3) Identify reinforcers.
(4) Administer the reinforcers.
(5) Modify the reinforcement program, if necessary to maintain or increase the frequency of productive behaviors.

The other two major purposes have been analyzed in a similar fashion.

The overall statement and its analysis into different levels of purposes constitutes a behavioral model for prescribing certain supervisor or leader activities at all levels of virtually any organization. The situations in which these purposes are sought, however, will be different in different organizations and at different levels in those organizations. In order to complete the analysis, we need to identify the situations in which these purposes are to be attained.

For the kinds of people who inhabit the particular levels of the particular organizations in which we are interested, we need answers to the following kinds of questions:

(1) What kinds of productive behaviors are required? What kinds of things must subordinates do in order to attain the organization's goals?

(2) Which of these productive behaviors do not occur as often as they should?

(3) What kinds of events are most effective as reinforcers? Quite often the most effective reinforcers are interpersonal expressions of approval. But often supervisors attend to their subordinates only to chastise them.

(4) What techniques can be used to administer the reinforcers effectively? Often the supervisor will have to be trained to say more approving and fewer disapproving things to his subordinates.

(5) What kinds of counterproductive behaviors typically occur? Subordinates may fail to report work difficulties such as equipment malfunctions, or subordinates may actually sabotage each other's efforts.

(6) What kinds of events typically maintain these counterproductive behaviors? Often, common management practices actually reinforce counterproductive behavior. Supervisors often reprove subordinates when they report work difficulties. And often

they administer incentives such as pay and promotion on a competitive basis, and then chastise their subordinates for not behaving cooperatively.

(7) What kinds of techniques can be used to minimize the occurrence of the various counterproductive or disruptive behaviors? For instance, we may have to change traditional incentive systems.

(8) What kinds of techniques can be used to monitor the occurrence of productive and counterproductive behaviors? If you can't observe it and record it, you can't manage it.

(9) What are the typical aversive conditions found at this level of the organization? We want to minimize aversive conditions because they elicit avoidance, escape, and aggressive behaviors.

(10) What kinds of techniques can be used to minimize the inadvertent reinforcement of counterproductive behaviors and the occurrence of aversive events? For instance, if we judged midnight requisitioning of supplies to be counterproductive, we would probably have to change the consequences of military inspections from fixing blame to providing help without blame. As long as the consequences of inspections can be aversive to people's careers, there will be cheating to avoid these consequences.

We will get different answers to these questions if our interest is in a battalion staff rather than in an infantry squad. In either case, the answers can be obtained only through the conduct of field studies using interviews, questionnaires, direct observation, and trial applications.

Note, however, that these field studies do not validate our model. They elaborate it. The model itself is valid to the extent that our theory of people operation and our information-gathering processes are valid. In this case, our theory of people operation consists of the principles of behavior modification.

Note also that the entries in the model are not independent. Although the entries in the lowest level of the model look somewhat like a conventional task inventory, you cannot pick and choose from among them. They must be either accepted or rejected as a total package.

Finally, note that the model consists of several levels, rather than just one as does the typical task inventory. This allows us to avoid the racking problem of selecting a single level at which to write all our tasks. Instead, different branches of our hierarchy can be analyzed on different levels, depending upon our differing states of knowledge. To complete the overall model, we would need to conduct similar analyses for the roles of the other workers and for the worker himself.

Similarities in the Analysis of "Hard" and "Soft" Skills

The general systems engineering process should be the same, whether we are dealing with "hard" or "soft" skills:

(1) Identify the purposes of goals of the system. In doing so, begin with very broad purposes and analyze these broad purposes into successively more detailed purposes until we reach a level at which they can be allocated to individual workers. Equipment designers do some of this kind of analysis, but the systems engineer will generally need to do an additional analysis. If the system doesn't contain any significant equipment, then the systems engineer will have to conduct the purpose analysis *in toto*.

(2) Identify a suitable theory of operation for the equipment or people with which our workers will interact. The theory must be appropriate to the function the worker is to perform on the equipment or people. Sometimes the worker will perform the function on himself rather than on someone else. For instance, target recognition and individual decision-making are self operations. The application of the theory of operation to the general analysis of a gross purpose or job function results in the development of a behavioral model of the job function.

(3) Identify the characteristics of the situation in which the worker will operate and which shape the responses he must make. Often, our theory of operation will guide us in the selection of appropriate situation characteristics. If we are dealing with a maintenance job, we'll want to identify routine maintenance schedules and malfunction and symptom information. If we are dealing with supervisory jobs, we'll want to identify actual reinforcing and aversive events.

(4) Apply our theory or theories of operation to determine what actions our worker ought to take in order to attain the appropriate purposes in specified situations. If we are dealing with a maintenance job, we may conduct a troubleshooting analysis. If we are dealing with a supervisory job, we will conduct a behavioral analysis.

The systems engineering process is not a fixed procedure to be administered in a stepwise fashion. We frequently learn something in a later stage that will cause us to revise an analysis done in an earlier stage. And, frequently, there are glaring and unsuspected gaps in the system or job that we are analyzing.

When finished, the relationship between the job and the purposes of the organization will have been established. We will have identified:

(1) A theory of operation for the equipment used by the worker, mechanical or human equipment.

(2) The specific purposes a worker must attain.

(3) The probable situations in which the purposes will need to be attained.

(4) The actions required to attain these purposes in these situations.

We will then be in a position to design job sample practice and testing procedures. If it is a maintenance job, students may troubleshoot a malfunction inserted in the equipment. If it is a supervisory job, they may attempt to solve a work motivation problem in a role playing situation. Instead of inundating students with information about troubleshooting or about leadership, we will have them practice specific troubleshooting or leadership skills in simulated job situations. In the spirit of the term, but not its literal meaning, it is still "hands-on" instruction regardless of whether it is a "hard" or a "soft" skill.

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PROCEDURES FOR IMPLEMENTING SOFT-SKILL TRAINING IN CONARC SCHOOLS

John P. Fry

During the past nine months, one-half of Work Unit MODMAN efforts have been directed toward investigating procedures for systems engineering soft-skill job functions (e.g., command, supervision, and leadership) such as are found in Officer Advanced Courses (C-22) and similar career-type instructional programs.

As some of you may recall, a two-page outline of a general approach toward soft-skill training was included in the questionnaire which we sent to all CONARC schools to help us define "soft-skills". Respondents were asked for their reaction and other possible approaches. So, first, those reactions will be discussed.

Second, how that approach fits with the approach taken by the Chemical School in their C-22 course will be described.[1]

Finally, seven areas for improvement will be outlined. In general, it would appear that these efforts should have considerable impact on soft-skill training effectiveness in CONARC schools.

REACTIONS TO A PROBLEM-SOLVING APPROACH TO SOFT-SKILL TRAINING

Basically, we proposed that soft-skills could be learned best by an instructional approach (system) that was based primarily on a *problem-solving* framework or structure. Obviously, as change occurs or as time passes, memorized facts have a short life-span. In contrast, solving problems is not only far more meaningful to the learner, but it is also more transferable to future job assignments, especially where unique or novel situations not now anticipated or foreseen will be encountered.

The characteristics of a problem-solving approach include:

(1) *A job function orientation.* The focus is on broad-based job functions or skills that cut across any job requirement.

(2) *An experiential orientation.* The active participation and involvement of the learner in performing is sought, rather than just reading or listening.

(3) *A simulation orientation.* Transfer of training is enhanced by practice in problem situations which simulate those found in real-life, on-the-job assignments; problem situations are complex, ambiguous and emergent.

(4) *A cooperative-evaluation orientation.* Opportunities to experiment with new techniques, to make mistakes, and to receive immediate feedback (primarily from peers) are emphasized. Evaluation is for feedback purposes (knowledge of results) rather than for competitive (grading) purposes.

(5) *A functional context orientation.* Concepts and principles are introduced when the student needs them. Self-instructional materials are the primary means of learning basic concepts and principles.

[1] As of 24 June 1973, the Chemical School was disestablished and the Chemical Officer C-22 course was eliminated. However, much of the material dealing with the experimental modifications would be relevant in similar courses in other schools.

(6) *A small-group orientation.* Small groups or teams of students are formed, each with a learning "facilitator," rather than having one lecturer for a whole class. Peer instruction is employed whenever possible.

(7) *A learning- and student-centered orientation.* Since student learning is the goal, students' needs are met on demand by immediate administrative response.

Appendix B includes the initial proposal, basic reactions to it, reservations, and other approaches recommended by respondents. In summary, reactions were very encouraging; 77% of the respondents wrote positive remarks like "Excellent!" or "I like it very much. . . ." More noteworthy was the high level of agreement among respondents. Several schools have either already established a similar instructional approach or are planning to do so.

Reservations to the approach centered around two problems: how to obtain the kind of instructors required and how to evaluate students without being overly subjective. Chaplain O'Shea of the Chaplain School, who had experience with a similar approach, provided two insightful comments: (a) learning through "discovery" while in the process of "doing" something, and (b) introducing cognitive informtion at the point of need, so that it is most useful to the student (functional context).

Other approaches recommended by respondents included specific methods such as In-Basket, Case Studies, Micro-Teaching or having students attempt problem-solving without adequate resources or time. Remaining suggestions were quite heterogenous, but all could fit within a basic framework of problem-solving.

In summary, there seems to be much support among CONARC systems engineers for a problem-solving approach to the soft-skill training. Let us look now at the Chemical School's implementation of such an approach in redesigning the C-22 course.[1]

THE CHEMICAL SCHOOL'S PROBLEM-SOLVING APPROACH

The Chemical Officer Advanced Course had had a general history of dissatisfied students—unmotivated, full of complaints, or "daring" instructors to teach them. In the old system, there was little coordination among instructors or departments. As a consequence, each instructor hung his piece of "important" knowledge on students as they passed that instructor's station—exactly like an assembly line. Furthermore, instructors were concerned more with how to lecture than with how students learn or how they will use information once they take job assignments.

By backing off far enough from the compartmentalized structure of the original course, LTC Roark and his associates were able to make use of the systems engineering principle of job analysis. That is, they identified that the graduates basically ought to be able to solve problems and make decisions. Because of the variety of job assignments to be expected, only 5 to 10% of the graduates' time would be spent functioning as chemical-oriented branch officers. Thus, they would soon be required to solve a variety of problems, most of which would be unrelated to their previous "hard-skill" experience and training.[2]

In fact, when incumbent commanders were asked what abilities they most desired in Chemical Corps officers, problem-solving ability ranked right behind proficiency in CBR. Other broad-based job functions were also identified, such as interpersonal and communication skills. A Graduate Profile was derived (Appendix C) which was quite general but met all identified on-the-job needs. When more specific training objectives

[1] The course evaluation was conducted at the request of Thomas E. Chandler, Educational Advisor, and LTC Thomas R. Roark, Advance Course Director.

[2] Chemical branch officers seldom become commanders; mainly they serve as staff officers.

were proposed, only arguments ensued. It was clear to those redesigning the course that task inventories, as advocated by conventional systems engineering procedures, were trivial and unsuited for the "soft-skill" training required by Advanced Course students.

Thus, LTC Roark's primary training goal became devising an environment where students could solve problems within the context of jobs they might encounter.

Problem-Solving As a Framework

In most educational settings, if problem-solving is required of students, it is quite specific. That is, problems and methods of solution are well specified and the student is evaluated on his arriving or not arriving at a correct solution—not on his ability to identify the problem, to select the best method of analysis, or to analyze the problem and develop possible solutions. Likewise, under conventional methods of instruction, the learner leaves a course mostly with answers to "old" or routine problems, not necessarily with skills in how to solve new or emergent ones.

However, if students are required, as they were here, to seek out and apply information in solving nonroutine problems that closely approximate (simulate) typical officer on-the-job performance requirements, they will be able to begin functioning effectively once they face on-the-job problems. They will also know how to seek out knowledge from whatever resources are available—be they technical manuals (TMs), Army regulations (ARs) standing operating procedures (SOPs), peers, staff members, subordinates, or consultants. They become skilled at locating information and using it, rather than just becoming repositories of rapidly aging knowledge. As far as knowledge acquisition goes, they do not learn all of the information normally spewed out in lectures; rather, they learn, through inquiry and initiative, to find samples of that information—that which is relevant and meaningful toward solving realistic problems. It should be noted that such a problem-solving framework or "hollow shell" easily accommodates all subject matter presently perceived as essential to graduates, or any new information which may become required learning in the future.

The Chemical School's Advanced Course 36 weeks of training is roughly split into six phases or six levels of command (each can be conceptualized as a learning vehicle):

Phase I—Company/Battalion
Phase II—Brigade
Phase III—Radiological Safety - Prefix 5
Phase IV—Division
Phase V—Installation (CONUS Base)
Phase VI—Higher HQ/Logistics

Phase III, Radiological Safety, is taught by conventional instructional techniques; it is quite quantitative and technical and apparently fits that instructional methodology quite well.

The reason for six phases is functional. As graduates progress upward in organizational levels of the Army, they will be asked to solve similar problems (e.g., drug abuse), but at different levels of complexity. In other words, during the 36 weeks (except during Phase III) students might encounter the same problem five times, but at increasingly more difficult and more complex levels.

Problem situations were derived from many sources, but the emphasis is on "realistic" situations where problems are imbedded in the information supplied. A local chemical battalion contributed many problem situations that fit an initial "in-basket" type of instructional methodology. In later phases of the course, problems were introduced via operations orders. There were no school solutions and often no final solution was required. Students usually were required to brief a field-grade officer familiar with the problem area before complete analysis could be carried out.

Small Groups and Evaluation

To implement the problem-solving approach, small groups of four to six students became the basic instructional unit. A small group format provides students with opportunities to help each other learn. At this stage of professional development, it is not too uncommon for a given student to be more knowledgeable and more experienced about a given topic than even instructors. Thus, evaluation, in the form of immediate feedback, can be meaningfully given by one student to another student. In fact, students are often more willing to accept and to learn from their mistakes if evaluation is in the form of immediate feedback from peers. Moreover, learning from mistakes is enhanced and small groups can become teams in which cooperative learning takes precedence over competitive learning.

Nonetheless, students were critiqued daily by consultants and "rented faculty" who evaluated their products (analyses and briefings). Criteria were no longer based on how many facts students knew, but whether they could use factual information. The level of criteria became analogous to that of the real world, where a general evaluation is more relevant to success or failure. In any event, except for CONARC requirements for class standing (top 20%), competitive grading was eliminated.

Student-Centered Learning

Instead of platform lecturers, instructors become resource personnel capable of consulting with student groups and advising them in their solving of assigned problems. The emphasis was on learning and student control of that learning.

Each of the six phases is coordinated by a Phase Leader, who is assisted by faculty consultants—experts in that particular phase. Consultants were only required to be available for two hours per day during their five- to six-week tour of duty. Since they served only as resources (they had no lesson plans, films, or slides and gave no lectures), student teams met with them during the two hours as they felt it necessary. Thus, in a typical 40-hour week, there were only eight hours that required student attendance (e.g., guest speakers, seminars, or electives). Although students were able to come and go as they pleased, in practice, assigned problems caused them to work many more than 40 hours per week.

Summary Thus Far

So far we've discussed an instructional approach to soft-skill training which is problem-solving based. It includes *experiential* learning in *small groups*. Students solve *simulated*, job-related, problems by means of broad-based *job functions*, acquiring information in a *functional context*. The work is *student-controlled*, and students are *evaluated non-competitively*. Thus, all seven characteristics outlined previously are utilized in the Chemical School's C-22 Course.

SEVEN AREAS FOR IMPROVEMENT

The first class to learn under the new system was about three weeks from graduation when I interviewed one team of six students. In general, they considered their training to be worthwhile because they were learning information through solving realistic military problems. They acknowledged that their motivation to continue learning, even during the final weeks of the nine-month course, resulted from: (a) peer pressure, (b) a past history of satisfaction from having achieved meaningful learning, and (c) the challenge of the present problems.

Nonetheless, they felt several areas needed improvement. Likewise, our experience here at Fort Bliss in developing and testing out an instructional system very similar to that of the Chemical School, but much shorter, suggests that a number of improvements can be made without destroying its integrity or viability.

While working on MODMAN concepts and procedures, we have been fortunate to have been able to try them out in a Performance Counseling Workshop, which was previously developed for MG R.L. Shoemaker and the Fort Bliss Modern Volunteer Army (MVA) office. The workshop provided time to repeatedly test out the new methodology, evaluate its "bugs," revise it, and then re-test it. Our final product incorporates a number of methodological innovations which should help to improve the basic characteristics of the Chemical School Advanced Course.

The Performance Counseling Workshop

Our workshop is problem-solving based. Students learn to become facilitators of both individual and group problem-solving. It also includes the seven problem-solving characteristics mentioned previously: Broad-based job functions are learned experientially via solving simulated problems in small group settings while information is acquired in a functional context under student-centered conditions with an emphasis on immediate evaluation from peers.

The basic instructional design can be conveniently viewed as a sequence of five training methods which approximate real-life situations more and more closely. Table 1 lists these five training methods, each of which reflects a degree of approximation to on-the-job performance, along a "fidelity of simulation" scale. Associated student behaviors and training objectives, as well as the training goal (behavior application on-the-job) are also listed on the table.[1]

Training Methodology

The first training method, introductory briefing, is used only for student motivation and overview purposes. Nonetheless, feedback from students is sought so as to determine students' entry level and to detect misperceptions of training intent.

The second training method involves self-paced learning of concepts and principles by means of self-instructional, modularized materials where actions, conditions, and standards are specified. As soon as a student feels that he has learned the objectives for each module of the material, he can test himself (Method 3). Cognitive/verbal learning is integrated with skill acquisition as much as possible, making use of the "functional context" principle of training. Also, peer-instruction is emphasized wherever appropriate.

The last two training methods require that small groups of students be formed, each with an instructor or learning facilitator. His function is to serve as a learning resource to the group, to ensure quality control and to guarantee a risk-free environment. Class time is devoted to either observation of behavior or repeated practice of analytical or behavioral skills in simulated problem situations. All students in each group either observe or take part as participants. Observers are at least able to react to the problem situations vicariously, enabling them to participate constructively in debriefings that follow.

Initial simulation exercises are short and simple, with clear-cut solutions, requiring direct application of only a few skills (similar to micro-teaching). Later, as students become more confident and more skilled, the level of fidelity of the simulated problem situations is correspondingly increased in complexity and difficulty. The goal is to maximize transfer from the training environment to the job environment.

[1] In a course (e.g., C-22), this sequence of training methods would be repeated as many times as necessary.

Table 1

Training Methodology and Fidelity of Simulation[a]

Fidelity of Simulation	Methodology	Student Behavior	Objectives
Least Fidelity	1. Introductory briefing	Listens to presentation	Motivate student to participate; overview.
	2. Information presentation	Reads specific and self-instructional assignments.	Presentation of concepts and behaviors.
	3. Testing for mastery	Takes a self-test on written material.	Discrimination between concepts; immediate feedback; quality control.
Moderate Fidelity	4. Active participation	Observes behavior	Modeling of behavior.
	(a) Mini-problems	Watches video tapes and answers paper and pencil test.	Discrimination between behaviors; immediate feedback.
	(b) Full-problems	Watches or participates in simulated problem situations.	Vicarious practice of knowledge and skills; focus is on behavior.
	5. Skill practice	Takes role of leader and attempts to solve simulated problems.	Practice of skills in low-risk environment.
	(a) Mini-problems	Applies old or new behaviors; conducts debriefing critique of consequences of his behavior.	Distinguishes between productive and counter-productive behaviors in direct causal relationships.
Most Fidelity	(b) Full-problems	Analyzes problem situation, plans behaviors and sets objectives; conducts debriefing of his behavior and its consequences.	Analysis based on knowledge, application of skilled behavior, behavioral feedback focusing on consequences of specific and interrelated behaviors.
TRAINING GOAL:	Behavior application: Models/uses/tests appropriate behaviors on-the-job, revises as necessary. Initiation of a viable feedback system by the training of subordinates.		

[a]Based on a student manual for performance counseling workshops, by J.P. Fry, HumRRO Western Division, August 1972.

A Basic Difference

In the Chemical School Advanced Course the emphasis is on obtaining depth of content by concentrating on acquiring information through the development of solutions to simulated problems. Although students try to find out how to best use information, analyzing and identifying strategies, processes, or methods of attack are *not* the focus of learning. Effective processes should emerge from the act of problem-solving—i.e., trial-and-error learning. Learning from peers, using past experience or modeling on consultants are typical trial-and-error methods of acquiring processes.

In contrast, both we and the Chaplain School focus on obtaining depth of content by concentrating on processes—the *how* of getting things done. For example, both of us would be interested in *how* to lead small group discussions or *how* to handle or counsel an over-emotional soldier. In addition to advancing specific process techniques, we both state behavioral objectives at the outset.[1]

Recommended Improvements

What follows are seven recommended improvements to the basic characteristics of the Chemical School's C-22 Course. Some of them also apply to the C-22 Course at the Chaplain School.

(1) *Behavioral Objectives Should Be Made Known.* Students should know what behaviors they ought to perform, what conditions will be present, and what typical performance criteria or standards are. The Chemical School Course designers, in an effort to create a student-oriented instructional environment, purposively refrained from prescribing what was to be learned because they felt students should "discover" processes or techniques for themselves.

This approach led to confusion and anxiety, with students banding together to try to discover what the consultants really thought was a good analysis, and so forth. Although such ambiguity is representative of real-life and promotes peer cohesion, it makes learning difficult. Researchers who have studied "discovery" as a learning technique are convinced that for exploration to be meaningful, the objective of the task must be known and the learner should know where he stands with respect to it (Bruner, 1961). Tasks that are too uncertain arouse so much confusion and anxiety that exploration behavior is reduced.

Previously, it was mentioned that a task analysis of Advanced Course content led to trivial entries. This does happen if the focus is on content alone. But a behavioral analysis of processes that make up any larger or broad-based job function can produce a hierarchical sequence of specific skills that are not trivial (Whitmore, in press). Thus, the systems engineering steps are valid for soft-skills. All that is needed is a process point of view rather than content.

(2) *A "Guided" Discovery Instructional Format Ought To Be Adopted.* "Guided" Discovery allows:

(a) *Efficient* acquisition of concepts and principles novel to the student. He does not have to waste time and energy reinventing the wheel.

(b) The student to *test* out novel concepts and behaviors so that he can convince himself that they work. This is especially useful when behaviors contrary to his experience and background are ones he ought to be using.

"Guided" Discovery begins with a general specification of behavioral objectives and the learning of basic cognitive concepts and skills. As the student makes mistakes in

[1] In the Chaplain School, Advanced Course students are given much more freedom to modify objectives and MOI than in our workshop. However, they are less oriented to problem-solving, since command or leadership positions are not of interest to them.

applying these concepts or skills as behaviors, additional information is brought in as it is needed. Thus, the *functional context* principle of meeting students' needs when they have them can be utilized. "Guided" discovery lends itself to a student-centered learning orientation.

Mager and McCann (1961) tried a similar instructional format with newly graduated and newly hired engineers who were required to learn essential information about their new organization. With only behaviorally-stated training objectives and a list of resources available, a group of six "trainees" was able to complete their training in one-third the time of previous "trainee" instruction. They displayed more confidence and were able to work with less direct supervision than previous "trainees".

It would be an ideal learning environment if a student could control the rate of his information acquisition, structure the information to fit his particular background, and obtain additional information on demand. An experiment to test such an instructional design proved that learning is increased, but only if the student has had past experience and success in making inquiry and solving problems on his own (Fry, 1972). Until computers are built which can respond as described, however, requirements for efficient, complete or effective student-control or "discovery" cannot be met, even for information acquisition. Since soft-skills involve processes or behavioral skills which require application within group settings, group feedback or "guidance" remains an essential ingredient in the instructional design.

(3) *Acquisition of Information Needs To Be Made Easier.* Several students saw the present information acquisition system as inefficient in terms of effort and time.[1] There is a need to develop short, on-the-shelf, learning materials, preferably self-instructional in design, so that students who are weak in certain areas can quickly and efficiently pick up necessary skills and techniques when they need them. Such modular-packaged programs should include specific behavioral objectives and performance criteria. The learning center concept is appropriate here. Since they would be in *support* of primary learning goals, their number and content should be based *strictly* on student needs.

Nonetheless, peer instruction remains a valuable means of utilizing the resources available within each group of students. Only when students exhaust their own resources, should self-instructional materials be prepared or used. This requires repeated faculty testing, sensitivity, and responsiveness to student needs instead of what is convenient for administrative purposes.

The Chemical School faculty responded to their students' needs by designing realistic and relevant problem situations. Now they need to listen for what is needed to make learning more efficient, at the same time allowing the student to learn skills, processes, or techniques which are superior to those which they bring to school or to those known by their instructors.

(4) *Additional Process-Based Job Functions Need To Be Integrated Into Existing Training Goals.* For example, behavioral process skills for dealing with subordinates are beyond the scope of the course as it presently exists. Other schools, especially, need to train their students in such areas as performance counseling, motivation, and leadership.

A problem-solving instructional framework is well suited to leadership training because effective leadership/management is *not* only using information; it is applying analytical and behavioral skills, appropriate to the situation, after an analysis has been made. Listening to lectures, reading books, or solving paper problems with the goal of understanding and accepting new ways of handling "people" problems is *not* sufficient. Such inadequate training invariably causes those who attempt to try new approaches of leadership/management to experience failure and frustration. As a consequence, they

[1] Army manuals were judged difficult to read.

usually revert to more familiar methods when training concludes. Students need more than mere exposure to alternative behavioral skills; they need to practice using them until they can operate outside of narrow stereotyped frameworks.

(5) *Behavioral Scientists Need To Be Brought Into the Analysis of Job Functions.* Recently, through much research and development, behavioral scientists in industrial and organizational settings have discovered and derived new processes and behavioral techniques which have great usefulness for Army leaders. Are we going to have students learn how to use the best known state-of-the-art techniques or are we expecting them to not only invent the wheel but also discover the latest and best tire to go on it?

If CONARC schools do not make use of behavioral scientists, too much value is placed on individual instructors' past personal expriences or their hypotheses of how best to cope with problems they haven't experienced. In our experience the best available behavioral techniques rarely are used by job incumbents, let alone by instructors. If instructors (consultants) do not exhibit the best known behavioral skills, they not only serve as poor models, they may reinforce counter-productive behaviors as well.

Behavioral skills, processes, or job functions which lie outside the range of existing faculty experience or training require expert analysis. Behavioral scientists appear to be best able to analyze officers' job requirements to identify problem areas and then determine appropriate job-tested behavioral techniques which will enable graduates to effectively handle them.

(6) *Students and Instructors Need To Be Trained To Use a Problem-Solving Framework.* Chemical School students were confronted with a learning environment that required skills unlike those useful in passing college courses. Thus, "shock" occurred for some. It took time and understanding for some students to learn what to expect and what was expected of them. The excessive degree of "freedom" and ambiguity inherent in problem-solving caused some students, who had been successful in "parroting back" information in the past, now to "fail".

Specification of behavioral objectives will greatly reduce ambiguity, but the requirement to take initiative in solving problems where uncertainty exists, demands special, systematic, training to overcome prior conditioning (Campbell, 1964; Dunbar and Dutton, 1972; Fry, 1972). Likewise, instructors need training for conversion from traditional roles into consultants or facilitators of learning. The Chaplain School C-22 Course begins with a special five-day workshop to develop students and faculty into effective learning teams.

(7) *Administrators Need Training In Organizational Development (OD) Skills.* In the beginning, LTC Roark and his associates redesigned the C-22 Course their way, but they had difficulty getting acceptance from faculty. If other schools wish to implement similar changes, curriculum designers and administrators need to know how to initiate change and how to develop and adapt their organization to the needs of students and the changing environment. Organizational development is the name for total-system, planned-change processes that increase organizational effectiveness to the point where self-renewing practices become SOP (Beckhard, 1969; Gardner, 1964; Schein, 1969).

Organizational development techniques, which include problem-solving skills, not only aid in initiating change and setting goals, they also aid in maintaining an instructional system that is responsive to both the real world and students' needs. Although systems engineering of training procedures is supposed to accomplish similar goals, nowhere in the regulations is there a mention of the necessary processes. Chemical School designers have already undertaken steps to avoid hardening of the arteries or inbreeding of ideas. Self-renewal is accomplished by encouraging students to challenge the instructional methods, content, and goals or by rotating staff personnel. Other methods are possible and probably will be needed as time will bring new administrators and staff who will challenge the existing system. Reactionary change could replace planned change

unless the benefits of a problem-solving format can be experienced by newcomers within a management system which is itself problem-solving and continually self-renewing.

CONCLUSION

An approach toward implementing soft-skill training in CONARC schools, specifically C-22 courses has been outlined. The instructional model is fairly well conceptualized and a testing phase has begun. Further development and testing should soon provide sufficient experience and feedback to generate specific procedures and processes which will enable CONARC schools to adopt and implement a similar instructional format. Constraints imposed by practical reality will no doubt play a part in the final design at each school.

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Appendix A

A BEHAVIORAL MODEL (PURPOSE ANALYSIS) OF A LEADERSHIP FUNCTION BASED ON PRINCIPLES OF BEHAVIOR MODIFICATION

01 Designs and implements management practices which strengthen productive behaviors and weaken counter-productive behaviors emitted by his people.

01 01 Designs and implements practices for reinforcing productive behavior.

01 01 01 Identifies and defines productive behaviors.

01 01 02 Specifies and implements techniques for monitoring the occurrence of productive behaviors.

01 01 03 Identifies potentially effective and feasible positive reinforcers.

01 01 04 Designs and implements techniques for the contingent administration of positive reinforcers on an appropriate schedule.

01 01 05 Modifies reinforcement program if desired changes fail to occur.

01 02 Designs and implements practices for minimizing the inadvertent reinforcement of counter-productive or disruptive behavior.

01 02 01 Identifies and defines counter-productive or disruptive behaviors.

01 02 02 Specifies and implements techniques for monitoring the occurrence of counter-productive or disruptive behaviors.

01 02 03 Designs and implements techniques for eliminating the inadvertant reinforcers.

01 02 04 Modifies reinforcement elimination program if desired changes fail to occur.

01 03 Designs and implements practices for minimizing the occurrence of aversive stimuli in the environment.

01 03 01 Identifies aversive stimuli in the environment.

01 03 02 Designs and implements techniques for eliminating or reducing aversive stimuli in the enivronment.

General Operational Characteristics of a "Motivated Worker"

01 Performs an adequate amount of work that leads to the attainment of organizational goals.

01 Exhibits a low frequency of interference with the work of others.

03 Coordinates his work activities with the work activities of others in keeping with organizational goals.

04 Helps others to perform their work, if necessary to meet organizational goals and if he is able to do so.

05 Minimizes the effects of outside disruptions on his own work and that of others.

06 Chooses to remain in the organization for the remainder of his work career.

Appendix B

PROPOSAL FOR A PROBLEM-SOLVING APPROACH TO SOFT-SKILL TRAINING

A Look Into the Future

Now that you've had a chance to help us define what "*soft-skill*" jobs are or are not, we'd like your reaction to our general conception of how they should be taught.

Basically, we feel that acquisition of most of the knowledges and skills of "*soft-skill*" courses must involve the active participation and involvement of the learner. Furthermore, for such knowledges or skills to be transferable, they must be used by the learner in the active solving of training problems very similar to those found on-the-job in real-life military assignments. As such, the instructor is not concerned with providing answers or solutions to the learner but rather with providing him with a variety of simulated "*emergent*" situations. There, the learner can experiment with new techniques, make mistakes, and learn from them (receive immediate feedback) without fear of embarrassment or fear of evaluation.

Furthermore, we feel that basic concepts and principles can be learned effectively by individualized, self-paced methods. Since learning objectives (including actions, conditions and criteria) will be stated in behavioral terms, the learner will know when he has sufficiently mastered them. Thus, before he attempts to apply them to simulated situations, he will be required to be at least cognitively knowledgeable in the basics.

Next, small groups of learners are formed, each with an instructor or learning facilitator. His job function will be to provide essential resources and guarantee a non-threatening environment, one removed from disruption and undue observation. Class time is devoted to repeated practice of knowledges and skills in simulated situations. Peer evaluation is the primary means of feedback and is immediate, accurate, and corrective in nature.

For example, assume you were about to design a POI to teach combined arms doctrine in the Advanced Course (say Air Defense doctrine to Infantry types). Why not have students learn the information from the point of view (perspective) of one who has just taken command of an appropriate unit where the knowledges and skills of Air Defense doctrine are needed to solve a military problem? Thus, instead of having to memorize a list of concepts, the student would only be required to know where they are located (perhaps best in a condensed version of FMs) and be able to use them in solving realistic problems.

Obviously, as change occurs or as time passes, memorized facts have a very short life span—but having to solve problems in school by use of concepts or principles is not only far more meaningful to the learner but also more transferable to future job assignments, especially where the officer will encounter unique or novel situations not now anticipated.

Of course, such terminal tasks can be very complex and difficult. Therefore, a hierarchically arranged series of less difficult learning steps are required before final terminal objectives are attempted. In addition, modification and updating of simulation situations to reflect change would be built into the instructional design.

Before reacting to these ideas, please read the following definition of simulation.

Simulation

Simulation is a technique for modeling real-life complex situations. By the actual practice of new modes of responding to stimuli which are highly similar to real-life situations, simulation exercises are most effective in extinguishing old, inappropriate responses and establishing new, appropriate responses. This is especially true when "knowing *what* to do, and *how* to do" is not equivalent to "being *able* to do".

To insure maximum transfer of learned skills to real-life situations, training situations should be complex, ambiguous, and *emergent*, so that, as in real life, they require the trainee to sort out the important facts from the confusion of events surrounding him and to identify the essence of a problem as it arises. For example, one of the more important skills a leader must develop in order to be effective is to be able to recognize when a problem exists and to be able to identify it correctly.

Furthermore, simulation enables the learner to practice in a large variety of critical situations in a short time. Thus, he can reach established criteria relatively quickly. In addition, simulation produces considerable involvement and motivation on the part of participants; a condition considered necessary for higher level type learning to occur. Simulation is also well suited to role-playing, another method of obtaining learner involvement and concern. Finally, self-evaluation by trainees of their performance can be easily encouraged, especially through comparison with responses of other participants.

In general, initial simulation exercises should be simple, i.e., with clear-cut solutions and permitting direct application of concepts and principles. Later, as success builds confidence and skills increase, more difficult simulation exercises can be tried. When to introduce them is subjective, it depends on student learning rate and training time limitations. The goal is to facilitate the transfer of learned principles and skills to real-life problem situations with minimum effort and maximum confidence.

Basic reactions by 35 respondents to the question: *What do you think about the above approach to training in the soft-skill area?*

- Sound approach. . . . We are forecasting essentially the same approach . . . FY 73. Agree with the approach. . . . We hope to include much more individual and small group work in our advanced course. This approach is presently being tested on a trial basis. . . . [Six respondents indicated this approach or similar approach is presently being used or planned.]
- valuable
- definite application
- sounds good
- very effective
- In the soft-skill area, we believe that a maximum exposure to ambiguity and uncertainty provides a maximum gain in training.
- I very much like the approach and rationale. . . . This work should have been started five years ago!
- Excellent
- There is no doubt that simulation, as defined, has a prominent place in the 'soft-skill' area.
- I like it very much and we have gone in this direction.
- I think it would be a 100% improvement!
- Excellent! I favor simulation, but above all, I support hands-on training, i.e., using manual, regulations, etc. Not memorizing a 'laundry list'. Your ideas are great!
- The fact that something is different about the kinds of skills or performance factors required in any field of endeavor suggests that better ways and means to identify, structure, and organize such data must be developed.

- It is most welcome to see an effort, the results of which will assist in the systematic design of courses in the 'soft-skills' area.
- . . . an ideal approach to soft-skill education. . . .
- Appears to be a reasonable approach.
- Generally very appropriate. . . .
- Your analysis is correct.
- This appears to be a realistic approach.
- I heartily support your effort in this area.
- I think the above approach is realistic and a definite improvement over simply memorizing concepts, principles, etc.
- Interesting. . . .

Reservations expressed by 35 respondents to the question: *What do you think about the above approach to training in the soft-skill area?*

- Where will we get sufficient training time?
- More experienced instructors will be required:
  a. Authoritarians can't handle change from teacher- to student-centered instruction—'bull sessions' will appear to be a waste of time.
  b. Extensive training of instructors is required, but where will we get sufficient training time?
  c. The number of small group 'facilitators' required is a luxury that most school cannot afford, especially with manpower restrictions.
  d. Success depends on quality of the instructor or learning facilitator, thus instructor selection becomes a problem.
- Overuse of one method is a possible consequence.
- Army simulation, at present, is not *emergent* (ambiguous/uncertain). . . . Simulation 'samples' of real-life are often applied 'verbatim' by young officers to real-life problems.
- When documentation, doctrine and job standards are weak—simulation presents problems.
- . . . this approach must be used in conjunction with field observation in order to be effective.
- The solving of many small problems is not always tantamount to solving larger, more complex ones.
- The evaluation procedure remains highly subjective:
  a. Can a simulation be both sufficiently controlled for answers so that evaluation is valid, yet offer the range of variables even approaching that of real-life battlefield problems?
  b. Peer evaluation is 'blind leading the blind'—should also use superiors or subordinates as in real-life situations.
  c. Too many variables in situations addressed, thus quantitative measures will probably be fruitless and/or meaningless.
- Numerous 'hard skills' are embedded within what we are now referring to as 'soft-skill' courses. One must know *both* how to design a bridge *and* how to organize and supervise his resources to construct that bridge.
- While not denying the validity of self-paced methods, there is a point at which caution needs to be exercised in prescribing conceptual data as a prerequisite of group work. If conceptual material is reserved for a time before the group is formed, as seems implied in the survey, the group loses a primary vehicle for developing inter-personal skills and for internalizing the true foundation of the skills they must ply. I believe it is especially true of concepts that they become most meaningful and useful when they have been 'discovered' in the process of 'doing' something rather than in reading about them. Thus they become more

than ideas, but the basis upon which actions are taken, and, as far as is possible, should be dealt with in a group where ideas can be processed, bounced off others, tried out, and finally 'discovered' as essential to effective performance of a task. In this process, interpersonal skills grow.

Secondly, if the use of groups as learning teams becomes the media through which learning happens, as is implied . . . , the course designer must be very careful about what material is prescribed as individualized/self-paced instruction to be accomplished outside the group. One of the strengths of using a group as a learning team is that the cumulative cognitive knowledge of the total group is always superior to the knowledge of any single individual in the group (and frequently of the instructor as well). To prescribe cognitive data to be learned outside the group may rob the instruction of a significant resource—the group as instructor. Though it is true that at times the situation may dictate that involving several students in individualized study is more efficient than requiring the whole group to deal with it on a basic level, there are tradeoffs which must be considered in making the choice.

1) As the group assumes responsibility for teaching ALL its members, interpersonal skills are developed which are much more significant than the time spent in bringing the less knowledgeable student up to their level.

2) As the group teaches data, no matter how basic, it learns the data in greater depth.

Finally, data learned in preparation for an 'emergent' situation may be data which must be re-learned. It goes without saying that the most efficient way for cognitive information to be learned and retained is to introduce it at the point of need. As much as is possible, the learning situation should dictate at what point cognitive data is needed and introduced. To prescribe it as a prerequisite to a task objective may be to put it at a point least useful to the student. As far as is possible, the practice of prescribing cognitive data as a prerequisite to a training/learning objective should be minimized.

On another, but related topic, the concept of training objectives in Systems Engineering must be addressed. Systems Engineering seems to have been developed to respond best to hard skills. Thus, the concentration on 'tasks' is appropriate. In the soft-skill area, the concentration on 'tasks' seems superfluous and superficial. Particularly in the C-22 program (Officer Career Course), the specific tasks are vague. Those tasks which can be defined and measured very precisely are usually the least significant and could as easily be learned in OJT. Much more significant are tasks belonging to the affective domaine and impacting on his attitudinal environment. These tasks defy definition except in such vague terms as 'supervise,' 'manage,' etc., and are hardly the kind of tasks for which precise criteria or standards can be established. It is my opinion that the concept of tasks as embraced in systems engineering must be modified by incorporating attitudinal criteria. Thus, at least for C-22 students, the question which systems engineering must ask is not, 'What does the student need to be able to do,' but, 'What kind of a person are we trying to develop?'. Both curriculum development and methodology must converge on this modification if we are to produce someone to 'manage,' 'supervise,' etc., with any degree of sensitivity and effectiveness.

Answers by 35 respondents to the question: *What other approaches do you recommend or feel that are important for this purpose?*

- Certainly all methods and media should be considered lest we go as far in this direction as we were during the teacher-centered area.

- Lectures, conferences, case studies, seminars, panels, programmed instruction—all have their place. The objective is paramount. Schools should use methods that will, *for them*, best achieve the objective.
- Use the following approaches: case method (real problem presented to students for a decision); In-Basket (several mini-problems are given to students for a decision); Role-Playing; Debates; Practical Exercises; Mini-Teaching (e.g., briefings, and teaching and critiques).
- Focus on broad job functions.
- Instead of 'tasks' use subject areas (i.e., personnel management, military justice, training management, etc.) to obtain a consensus of opinion on the need for instruction in each area, then use the experience and expertise of the appropriate school staff and faculty to determine the subject area scope.
- Have students devise individual solutions to a series of realistic field problems in the absence of totally adequate resources and/or time. A similar technique could be employed with student groups, as appropriate.
- Emphasize face-to-face discussions with graduates in the field to determine their needs and what is expected of them. Continue with self-tutor, self-paced and Let's go Modern! Use casettes, tapes, film as modern civilian schools are using.
- Employ student-centered, performance-related training.
- Develop some situational performance tests, oriented to what the officer would do on the job and present them to the student in as close to the 'job environment' as you can make it.
- In many instances, due to limited resources, it is possible for the student to be put in 'planning' situations requiring students to prepare a plan for execution of some defined objective in which limitations are imposed on the range of his decision-making and limited resources made available for allocation.
- For soft-skill courses such as leadership courses, it is very important to design the task inventories carefully. They need to be sequentially arranged from the visualized start of an operation or job requirement for an expected job situation through to completion of the job requirement. Systematic breakdown of tasks are important. It's better to be in too much detail than not enough. Later summarizations can be made as necessary.
- Another possibility (which should not be used to excess) is learning by exception; i.e., attempting to perform the function without any previous instruction on basic principles or procedures. This is followed by a critique which brings out suggestions for improvement and/or points out actions committed or omitted which were detrimental to procedure, or technique which surpasses the 'school solution'. If not, the 'school solution' can always be contrasted with his, showing the rationale which supports the 'school solution'.
- The Group Process Plan (Indiana Plan) of the USA Chaplain School.

Appendix C

FACT SHEET

THE REDESIGNED CHEMICAL OFFICER ADVANCED COURSE

Beginning with the class opening in September 1971, the Chemical Officer Advanced Course has undergone significant change. The course is now designed to encourage maximum student participation, response, and growth by helping him to learn to cope with realistic and relevant situations in an atmosphere that allows optimum latitude for the exercise of initiative. To prepare the graduate for continuing growth, much greater emphasis has been placed on the fundamentals: the communicative; human relations; quantitative/computational; and conceptual/problem solving skills.

The curriculum includes the essential professional and technical knowledge, that is: principles, doctrine, concepts, techniques, and procedures. What has changed is the orientation of the course, the curriculum, and the faculty. No longer is the instruction theory- and instructor-centered. It is now learning- and student-centered. The philosophy that fostered the selection and teaching of material it was assumed the student needed to know, followed by practical exercises that directed the student toward narrow, almost specified, solutions, with little or no margin for error, has been done away with. It has been replaced with a philosophy that requires the faculty to respond to the student's real needs by finding, or designing, realistic, relevant situations that the student can imagine himself facing in the real world. The faculty gives the student only the minimal instruction that is pertinent to the situation. Great dependence is placed on the student identifying the problems inherent in the situations through his own participation and activity, learning by doing, individual effort, peer instruction, and self pacing. What might be called the "whole-school concept" is employed. The student calls upon the faculty, classmates, library, staff and support activities (to include the Post staff and facilities), and whatever outside sources he may need. He is given time and reason to use them. The lecture and conference are rare (except for certain specific technical subjects such as Prefix 5); the seminar is more common, but is kept to a minimum. Attendance at these is voluntary.

The vehicles used are the various command levels of the Army: company/battalion, brigade, division, installation (CONUS Base) and higher headquarters (to include high level logistics). These levels (at each of which the class spends 5-6 consecutive weeks) allow a design of the learning process which progresses from attacking relatively simple specified problems to more highly complex situations requiring identification of problems, followed by analysis and development of workable solutions. It should be understood that these levels are merely vehicles in the learning process and are not designed to emphasize the organizations selected. They provide a device for integrating learning in a logical progression, while at the same time illustrating problems and procedures similar to those that may be encountered in later assignments. Realism and relevance depend on the careful selection of problems and situations. As far as practicable these have been extracted from current records, documents, and files. Some of the actual reply or response documents are available. School solutions have for the most part been eliminated in that the overrriding objective is not a solution, *per se*, but the development of the student's ability to cope with problems and arrive at logical, sound approaches to solutions, recommendations, or decisions.

The class is organized into small work groups, membership of which is changed at each level. The class meets as a whole only occasionally for common instruction. A faculty consultant (normally an experienced major) is available to each group at all times to answer questions, provide guidance, closely observe individual and group action and interaction, and provide evaluations of the students.

Student evaluation is, for the most part, subjective, based on performance. The student is rated on what he can do, and how well he does it, not on what he knows as determined by objective recall or recognition tests. Performance in the course is based on written and oral presentation of solutions and the work, logic, and breadth and depth of overall understanding that has gone into these solutions. The system is essentially macro-evaluation as opposed to the micro-evaluation common to objective-type evaluations. Students are scored on a pass-fail basis for each performance with provision for recognition of distinguished performance.

GRADUATE PROFILE

THE CHEMICAL OFFICER ADVANCED COURSE GRADUATE MUST BE:

1. PROFICIENT IN TECHNICAL ASPECTS AND APPLICATIONS OF CBR.
2. ABLE TO IDENTIFY AND ANALYZE COMPLEX PROBLEMS.
3. ABLE TO THINK IMAGINATIVELY AND IN THE BROADEST RANGE POSSIBLE.
4. CONSCIOUS OF THE ISSUES AND PROBLEMS OF THE ARMY AND SOCIETY.
5. SKILLED IN INTERPERSONAL RELATIONS.
6. RELAXED IN THE PRESENCE OF HIGH-RANKING OFFICERS AND OFFICIALS.
7. ABLE TO DEMONSTRATE HIGH PERSUASIVE ABILITIES.
8. ABLE TO COMMUNICATE EFFECTIVELY—ABLE TO WRITE AND SPEAK IN SUCH A WAY AS TO PRESENT COMPLEX ISSUES CLEARLY.
9. FAMILIAR WITH PROBLEMS AND PROCEDURES AT VARIOUS COMMAND LEVELS.

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER HumRRO-PP-3-74	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SOFT SKILLS: DEFINITION BEHAVIORAL MODEL ANALYSIS TRAINING PROCEDURES		5. TYPE OF REPORT & PERIOD COVERED Professional Paper 6. PERFORMING ORG. REPORT NUMBER Professional Paper 3-74
7. AUTHOR(S) Paul G. Whitmore and John P. Fry		8. CONTRACT OR GRANT NUMBER(S)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Human Resources Research Organization (HumRRO) 300 North Washington Street Alexandria, Virginia 22314		10. PROGRAM ELEMENT PROJECT TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Research Institute for the Behavioral and Social Sciences, 1300 Wilson Blvd. Arlington, Virginia 22209		12. REPORT DATE March 1974 13. NUMBER OF PAGES 39
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

HumRRO Western Division at Fort Bliss, Texas. Three papers presented at the CONARC Soft Skills Conference, Fort Bliss, Texas, December 1972

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Behavioral Model	Management Training	Soft Skills
Education	Military Training	Training Procedures
Instructional Approach	Problem Solving	
Job Analysis	Service Schools	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Three papers dealing with soft skills analysis and training are presented. "What are Soft Skills?" by John P. Fry and Paul G. Whitmore describes a questionnaire designed to clarify the terms "hard" and "soft" skills. On the basis of results from representatives of CONARC schools, soft skills are defined as important job-related skills that involve little or no interaction with machines and whose application on the job is quite generalized. "The

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

20. (Continued)

Behavioral Model as a Tool for Analyzing 'Soft Skills'" by Dr. Whitmore discusses leadership and motivation job functions in terms of principles of behavior modification, and describes development of a behavioral model of the different levels of an organization. "Procedures for Implementing Soft-Skill Training in CONARC Schools" by Dr. Fry describes the instructional approach based on a problem-solving framework, tested at the Chemical School with the redesigning of their C-22 course. Small groups and student-centered learning were important factors in the instructional approach.